Technology Fact Sheet
Surface Contamination Monitor and Survey Information Management System

Nevada Operations Office
In Partnership with the Office of Science & Technology

Introduction

Five facilities at the Nevada Test Site are slated for D&D in the next seven years. The first facilities to be surveyed for D&D are in the Industrial Area, where nuclear rocket development took place. The site is in need of a monitor for alpha, beta, and gamma scanning of floors with continuous logging of the data. Currently, the baseline technology is multiple hand-held survey instruments using different detectors, hand recording of data, data reduction, and manual mapping of the data results. The baseline method is labor intensive, relatively slow, and subject to a technician's observation.

To address the site's need, EM's Office of Science and Technology (EM-50) has partnered with the Nevada Operations Office in an Accelerated Site Technology Deployment (ASTD) project with EM-50 providing $85K of funding. DOE-NV has committed $165k to this ASTD project. Through this activity, NTS will purchase a Surface Contamination Monitor and Survey Information Management System (SCM/SIMS) from Shonka Research Associates (SRA). The SCM/SIMS will be deployed at the Test Cell C facility, which was used for testing nuclear rocket reactors. The facility has a large exterior concrete pad and interior floor spacing requiring survey. The SCM/SIMS will be used for the characterization of concrete floors in order to expedite survey and closure at a reduced cost and risk. Use of SCM/SIMS is expected to be extremely beneficial in characterizing the Test Cell C facility, and is expected to be deployed at NTS' other facilities including the Pluto facility.

Technical Need

Surveying and documentation of alpha, beta, and gamma contamination is an issue faced in many decontamination projects. Automated surveying systems that record and display data as collected, coupled with post survey computer processing of the collected data can enhance survey reliability and reduce survey costs.

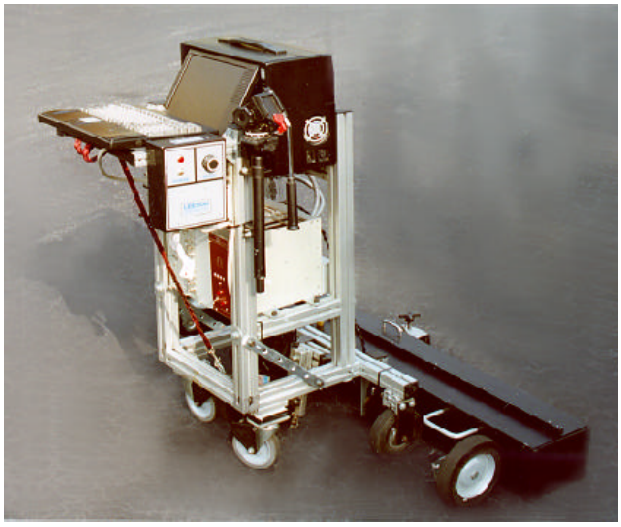
Using traditional radiation measurement techniques, the facility would be gridded into 1-meter squares on both floors and walls and then hand held meters and smears would be used to measure radiation levels. Subsequently, the data is reduced and transferred to building drawings to map the results. Such a process is time consuming and allows for a technician's subjective observation during the process.

Test Cell "C" Facility

System Description

The Shonka Position-Sensitive Radiation Monitor System consists of a cart mounted surface contamination monitor (SCM) and a survey information management system (SIMS). The SCM consists of a position-sensitive proportional counter that acts as the equivalent of hundreds of individual detectors aligned in a 4-ft long detector row. Using a low-cost wheel encoder, the detector scans over the surface in a series of 4-foot wide strips. The cart drive-motor speed along with the wheel encoder can be calibrated such that when a survey starts the system automatically records the radiological and location information.

The SIMS includes a video camera, an electronic data logger, and a personal computer (PC). The SIMS records both the intensity and location of the radioactivity in an electronic database and mapping software. The data is automatically downloaded to the on-board PC and stores all the information in binary files that can be analyzed by the system for report generation and re-examination. The system removes the technician's subjective observations from the process and produces more understandable reports of the radiological conditions. These reports can be graphical, with color-coded radiological levels overlaid on a CAD drawing or on a digital photograph of the room floor. This system is also capable of producing 2-dimensional and pseudo 3-dimensional surface plots of hot spot locations and the associated radiological measurements in units of cpm (or efficiency-corrected units of dpm). The system can be equipped with a variety of sensors to facilitate the detection of both beta/gamma and alpha radiation fields.



Surface Contamination Monitor

Benefits

SCM/SIMS can correlate 3-dimensional survey data images with the real-time video screen or automatically generate survey reports as color-coded 3-dimensional graphics or overlain on drawings or photographs of the site that give managers and technicians a more complete understanding of the contaminated area, thus facilitating optimal remediation planning.

SCM/SIMS displays to the operator the minimum, maximum, average, and standard deviation of the survey data in live time. Measurements exceeding regulatory results can be set to appear as either color-coded or in boldface type.

SCM/SIMS takes 400 measurements per square meter with a minimum detectable activity that is 100 to 200 times greater for detecting hotspots than the baseline technology. This provides a significantly higher confidence level in the completeness and the sensitivity of the radiological survey.

SCM/SIMS consistently maintains the proper survey speed and distance between the detector and monitor surface, significantly reducing the variation and uncertainty in the survey data.

SCM/SIMS has proven cost and productivity rates that are better than conventional baseline methods. As part of the Hanford C-Reactor Large Scale Demonstration and Deployment Project, SCM/SIMS had productivity rates five times faster for beta/gamma surveys and two times faster for alpha surveys. Cost of the system was 13% to 57% lower than the baseline.

It is anticipated that a cost savings of over $106k will be realized via the initial deployment of the SCM/SIMS. Savings will increase, commensurate with planned follow-on deployments.

Status

The balance of FY99 funding (ASTD) is to be provided to DOE-NV in March 1999. Deployment of the SCM/SIMS at NTS is planned per the following schedule:

Procure SCM/SIMS system	June 1999
System Training/Shakedown	Sept 1999
Initial Deployment (Test Cell C)	Oct 1999
2nd Deployment (Pluto Facility)	Dec 1999

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